

## INTERNATIONAL SEARCH REPORT

PCT/IB2005/050205

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H03M3/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H03M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, COMPENDEX, INSPEC, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 369 403 A (TEMES ET AL) 29 November 1994 (1994-11-29) figure 3 -----	1-4,8
X	XU X ET AL: "The implementation of dual-truncation Sigma Delta D/A converters" PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS. SAN DIEGO, MAY 10 - 13, 1992, PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS. (ISCAS), NEW YORK, IEEE, US, vol. VOL. 4 CONF. 25, 3 May 1992 (1992-05-03), pages 597-600, XP010061265 ISBN: 0-7803-0593-0 figure 2 ----- -/-	1-4,8

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 April 2005	01.08.2005
Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Müller, U

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 101 62 566 A1 (SIEMENS AG) 21 August 2003 (2003-08-21) figure 1 -----	1-4,8
X	XU X ET AL: "DUAL-TRUNCATION DIGITAL-TO-ANALOGUE CONVERTORS" ELECTRONICS LETTERS, IEE STEVENAGE, GB, vol. 28, no. 1, January 1992 (1992-01), pages 92-94, XP000278951 ISSN: 0013-5194 figure 1 -----	1,2,8
X	EP 0 660 532 A (AT&T CORP) 28 June 1995 (1995-06-28) figure 3 -----	1,8
Y	US 4 859 883 A (BRADINAL ET AL) 22 August 1989 (1989-08-22) figure 3 -----	5
A	NORSWORTHY S R ET AL: "A MINIMAL MULTIBIT DIGITAL NOISE SHAPING ARCHITECTURE" 1996 IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS (ISCAS). CIRCUITS AND SYSTEMS CONNECTING THE WORLD. ATLANTA, MAY 12 - 15, 1996, IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS (ISCAS), NEW YORK, IEEE, US, vol. VOL. 1, 12 May 1996 (1996-05-12), pages 5-8, XP000825501 ISBN: 0-7803-3074-9 figure 3 -----	1-4,8

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Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5369403	A	29-11-1994	NONE		
DE 10162566	A1	21-08-2003	NONE		
EP 0660532	A	28-06-1995	US	5424739 A	13-06-1995
			DE	69428869 D1	06-12-2001
			DE	69428869 T2	11-07-2002
			EP	0660532 A2	28-06-1995
			JP	7212236 A	11-08-1995
			KR	174028 B1	01-04-1999
US 4859883	A	22-08-1989	DE	3642168 A1	16-06-1988
			AT	103435 T	15-04-1994
			BR	8706707 A	19-07-1988
			DE	3789426 D1	28-04-1994
			EP	0271166 A2	15-06-1988
			JP	2613900 B2	28-05-1997
			JP	63161713 A	05-07-1988
			KR	9606644 B1	22-05-1996

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## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

see annex

### Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5, 8

Group I defines a sigma-delta digital-to-analog converter (DAC) including a digital to analog converting combiner and a second noise shaper.

Problem to be solved: Converting a multibit digital input signal in an analog output signal and reducing the quantization noise.

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2. claims: 6,7

Group II relates to a calibrating apparatus which includes a sigma delta DAC.

Problem to be solved: Calibrating a sigma delta DAC.

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